10 March 1976

report on

DAIG IN 21-75

Use of Volunteers in
Chemical Agent Research

by

the inspector general

department of the army

DEPARTMENT OF THE ARMY
OFFICE OF THE INSPECTOR GENERAL AND AUDITOR GENERAL
WASHINGTON, D.C. 20310

DAIG-IN 21-75

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Chemical Agent Research

10 MAR 1976

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DEPARTMENT OF THE ARM
OFF OF THE INSPECTOR GENERAL AND AUD. R GENE
WASHINGTON, D.C. 20310

REPLY TO ATTENTION OF: DAIG-IN

SUBJECT: Research Report Concerning the Use of Volunteers in Chemical Agent Research

This research report was prepared by Colonel James R. Taylor and Major William N. Johnson, Inspectors General, Office of The Inspector General, Headquarters, Department of the Army, pursuant to the Vice Chief of Staff Letter of Instruction, dated 21 July 1975.

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USE OF VOLUNTEERS
IN
CHEMICAL AGENT RESEARCH

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FOREWORD

During the 1975 hearings conducted by the Senate Select Committee to study Governmental Operations with Respect to Intelligence Activities, the U.S. Army's role in research and experimentation with hallucinogenic drugs became a matter of interest and concern to the Committee and the public. The coupling of Army efforts in chemical agent research and actions involving the Intelligence community resulted in a spate of publicity both factual and speculative.

During the same general timeframe, the ongoing joint hearings of the Senate Labor and Public Welfare Committee, Subcommittee on Health, and the Senate Judiciary, Subcommittee on Administrative Practice and Procedure, asked questions of the Army about the Human Volunteer Program, the quality of "informed consent" as related to research volunteers, and the adequacy of medical follow-up on those who had volunteered to take part in research projects over the years.

As a result of the several congressional hearings and subsequent publicity, numerous requests for information were received by the Department of Defense from congressional committees, individual members of Congress, private citizens and the media. The nature of the inquiries reflected the different interests involved and resulted in several different staff agencies within Department of the Army being tasked to provide the requested information.

The lack of factual information available to quickly respond to the inquiries illustrated an inadequacy of the Army's institutional memory on this subject area. This inadequacy was aggravated by inconsistencies in the limited data which was available.

These shortcomings in responding fully, accurately, and rapidly, particularly at a time when Governmental agency actions and programs were already suspect, placed an additional strain on the public's faith in the credibility of the U.S. Army.

To assure that requests for information concerning the Army's role in hallucinogenic drug research were answered factually, the Secretary of the Army directed that a research effort be made to determine what had been done in chemical agent research. Accordingly, The Inspector General and Auditor General, Headquarters, Department of the Army, was directed to conduct the necessary research to determine the Army's role in drug testing. A verbatim text of the Letter of Instruction which directed the research effort is reprinted below:

21 Jul 1975

SUBJECT: Letter of Instruction

The Inspector General and
  Auditor General
Department of the Army
Washington, D.C. 20310

1. Recent public and Congressional interest in the Army's use and testing of hallucinogenic drugs has generated numerous requests from the news media for information concerning these activities. Records currently available to the Army Staff indicate that these tests were conducted during the period from the early 1950's through the late 1960's at various locations in the United States and overseas. However, due to the lengthy time span involved in the testing program, many of the supervisory personnel involved in the program and the records and reports pertaining to the planning, conduct, and results of the tests have been retired. This situation places the Army in a position of not being able to reply quickly and factually to requests for information from various news and Congressional agencies.

2. You are directed to conduct the necessary research to establish the historical facts and circumstances surrounding the U.S. Army's participation in the testing of hallucinogenic drugs. Specifically, your research will be in sufficient detail to provide, at a minimum, the following information: a clear reconstruction of the programs and projects involved with particular emphasis on the rationale used as a basis for their initiation; appropriate mandates and authorizations upon which the testing programs and projects were initiated, examination of extent of volunteers, the use of subjects without subjects' knowledge; and the costs of such projects and programs funded by the Department of the Army to include the total cost of operation of the Special Operations Division, Fort Detrick, MD.

3. The Surgeon General and the Assistant Chief of Staff for Intelligence will provide technical assistance as required and will provide access to and copies of any reports pertaining to the testing of hallucinogenic drugs by the Army which are required to complete your research. The Commander, U.S. Army

Materiel Command, will provide assistance required by your research teams in gaining access to installations, testing facilities, and records storage facilities. The research teams are authorized access to all records, files, facilities, and information which they consider necessary to accomplish this tasking.

4. Your report will be submitted to the Chief of Staff as expeditiously as possible consistent with the requirement to insure that the information provided is complete, factual, and accurate.

S/
WALTER T. KERWIN, JR.
General, United States Army
Vice Chief of Staff

This mission was unlike the usual directive for inquiry or investigation normally assigned to The Inspector General for action. Instead of determining the facts and circumstances of a specific wrong(s) or allegation(s), the mission was to conduct a form of historical research; research which would determine exactly what the Army had done in chemical agent testing during the period 1950-1975. A period which probably had as many changes, programs, and problems as any comparable period in history: post-World War II; the Korean War; the Cold War; reorganization of Department of Defense; reorganizations of Department of the Army; the war in Vietnam; and major advances in medicine, the sciences, nuclear weapons, missiles, and aircraft. The sheer volume and frequency of change alone provided some indication of the magnitude of the task to be performed. From the outset, the research effort proved to be difficult and cumbersome.

The research was not to include any activities or arrangements between Department of Defense and the Central Intelligence Agency concerning biological/chemical agents and weapons systems for delivery, but was to be limited to the Army's participation in the testing of d-lysergic acid diethylamide (LSD) with emphasis on the rationale used as a basis for test initiation; authorizations upon which the testing programs and projects were initiated; and the costs of such projects funded by Department of the Army. An exception was made to the limitation on the research as it concerned DOD/CIA and biological agents, in that the total cost of operating the Special Operations Division (SOD), Fort Detrick, MD, from 1953 to 1971 was to be determined.

The research scope eventually was enlarged to include drugs other than LSD. Initially, the term hallucinogenic was used as a means of describing the extent of the research, however, as more accurate information was received, the inaccuracy and inadequacy of the term became apparent. Ultimately, the study was to include LSD and also other drugs generally classified as chemical incapacitating agents, to include benzilates and glycolates. All drugs investigated or tested during the period were not included in the research, however, those which figured prominently in the Human Volunteer Program were reviewed.

The search for records was to prove particularly difficult. Current records posed no particular problem, since records handling policies made them reasonably available; however, the majority of the records involved were not current. Most of the research effort, particularly on LSD, occurred during the 1950s and early 1960s; these records had long since been retired and in some cases destroyed in accord with normal destruction schedules. The frequent changes in the U.S. Army organizational structure resulted in many changes in unit designations and locations, resulting in records being retired, destroyed, or relocated without adequate concern for proper disposition of records with historical significance.

Where records were not available or where information gaps existed, plans were developed to interview the personnel involved, both the scientist and the subject volunteer. Since the research spanned a 25-year period, many of the personnel actively involved in the research programs were retired, quite elderly, moved to new locations, or deceased.

The history of the Human Volunteer Program was examined in considerable detail. The use of humans in chemical agent research was examined from the earliest days of the Chemical Warfare Service during World War I through the publication of the Secretary of Defense (Wilson) memorandum in 1953, and then tracing the development of the formal volunteer program in use today. The selection of volunteers, to include the pre- and post test medical examinations, care during the experiments, and most important, the quality of informed consent was examined critically by reviewing medical records maintained on volunteers and in limited cases interviewing the volunteers.

The thoroughness of the research effort is indicated by the following statistical data:

a. Interviews of 65 witnesses were conducted in 32 cities, in 17 states, and the District of Columbia and involved traveling in excess of 160,000 passenger miles.

b. Tens of thousands of pages of documents were reviewed at various locations to include the National Archives; the National Records Center, Suitland, MD; the Army Records Center, St. Louis, MO; the Army War College Library, Carlisle Barracks, PA; Edgewood Arsenal, Edgewood MD; Aberdeen Proving Grounds, Aberdeen, MD; Fort Detrick, MD; Fort McClellan, AL; and the files of the various staff agencies, commands, or units which might have been involved, no matter how peripherally, with the chemical research program. Additionally, witnesses were requested to provide any documents or evidence which might have come into their possession.

Certain events which occurred during the course of the research effort added to the complexity of the effort and served to stretch out the time required to complete the project. First, there were the allegations aired publicly on TV and other media reflecting on the fitness of the Chief of the Medical Research Division, Biomedical Laboratory, Edgewood Arsenal. The person involved was in charge of the drug testing program. An investigation concerning this matter was conducted and reported separately. Then, during the course of records and file searches it was learned that a civilian patient in a New York psychiatric hospital had died in 1953 after receiving an experimental drug which had been provided the hospital by the U.S. Army (Chemical Corps) as part of a research project conducted by the hospital under an Army contract. An investigation of this incident was also conducted and reported separately. Finally, during the course of the research information was received indicating that the U.S. Army Intelligence Center/School had conducted jointly, with the Chemical Corps, a series of research projects involving LSD at Edgewood Arsenal, U.S. Army, Europe, and the U.S. Army, Pacific. A report of those tests is included herein.

It is in this vein that the research was conducted. Every effort was made to obtain and review pertinent data. Where records did not exist, the testimony of witnesses was solicited to fill in the gaps. Where neither documentary or testimonial evidence was available, then license was taken by drawing logical conclusions or assumptions based on evidence available, past performance, or other indicators. Where this occurred, efforts to clearly identify such license is made.

CHAPTER I

HISTORY OF CHEMICAL WARFARE

General

The purpose of this chapter is to provide a brief description of the evolution of chemical warfare development and its employment by various combatants throughout military history.

Chemical warfare is generally thought of as the intentional employment of toxic liquids or solids to produce casualties, plus the use of screening smoke or incendiaries.[1]

History reveals numerous occasions where combatants employed chemical warfare to serve their tactical advantage. Some of these events are worthy of mention in this report in order to establish the roots from which the modern concepts have evolved.

Pre-World War I

Incendiary chemicals were recorded in warfare as early as 1200 B.C. in a form called "Greek Fire." This secret chemical formula caused a substance to spontaneously burst into flame on contact with water. Other combatants such as the armies of India and the Roman Empire later refined the process to make it employable on land as well as water.[1] This novel weapon is credited with saving the Byzantine Empire from enemy domination for nearly a thousand years. So effective was "Greek Fire" that it was still very much in use some two thousand years later. It was reported to have been successfully employed by King Constantine against the Saracens in 673 A.D.; and later by the Saracens against the Christians in the Crusades. A form of "Greek Fire" was used by Union General Gilmore in the American Civil War and caused Confederate General Beauregard to write that Gilmore was firing "the most destructive missiles ever used in war."[2]

Other forms of chemical warfare were reported in ancient times as early as 431 B.C., in battles between the Athenians and Spartans. In this instance the Spartans burned wood pitch and sulphur under the walls of the cities of Platea and Belium to choke the defenders. The Spartans also melted pitch, charcoal, and sulphur in huge kettles and blew the fumes over the defenders' lines by means of bellows. Still other recordings reflect that in 360 B.C. the Trojan King Aneas used a composition of pitch, sulphur, tow, resinous wood, and other inflamable substances which were hurled in pots from the walls of besieged cities. The Chinese developed stink pots, thousands of years ago, for both offensive and defensive employment. The ancient Japanese warriors used finely ground pepper to produce lachrymatory (tear) effects. In the Russo-Japanese War, crude grenades of rags soaked with arsenic compounds were burned by the Japanese on the ends of bamboo poles to generate choking fumes to waft on enemy trenches. In 1855, during the Crimean War, the British planned to use burning sulphur in the siege of Sebastapal. However, the plan was reportedly discarded as inhumane. Still later in the American Civil War, during the siege of Charleston, SC, the Union Army used burning wood that had been saturated with sulphur in an effort to force the defenders to evacuate the city.[2]

Although there is very little evidence to indicate that chemical warfare was of major significance in most early military confrontations, the potential of its future role was of sufficient concern to make it an issue at The Hague Conference of 1899. In fact, a prohibition of gas warfare was agreed to by a number of countries at The Hague, including ratification by Germany, however, neither the United States nor Great Britain signed this treaty, which banned use of gas filled projectiles.[3]

World War I

In August 1914 the French used rifle-fired tear gas grenades to harass the German attackers. Germany claimed this violated The Hague accord. The French countered that since tear gas was designed to control civil commotions, its use could not be considered an act of chemical warfare. Shortly thereafter, the British and Germans also employed tear gas. The Germans' use of chlorine gas on 22 April 1915, against the French and British at Ypres, was perhaps the first recorded significant gas attack. The gas had a definite demoralizing effect on the attacked forces.[1,2,3] Three months later the British hurriedly formed "The Special Brigade, R.E." On 25 September 1915 the British showed the Allies the folly of being unprepared to enter chemical warfare when the kilted members of the Special Brigade attempted to carry their chlorine filled cylinders into the German trenches at Loos, France. None of the chemical carrying attackers reached the German emplacements and very few of them returned. Loos became a tragic defeat for both the British 15th Division and their initial chemical warfare effort. Fortunately, the Germans' failure to exploit their success provided the remnants of the Special Brigade another chance.[5] Their second effort came on 13 October 1915 with the attack on Hulloch Redoubt. Having learned valuable lessons in defeat, the British use of gas met with marked success on this occasion.[5] The lid was off and chemical warfare was quickly integrated into battle plans on both sides.

Later still in World War I the Germans introduced phosgene, a choking gas, and by the end of 1915 they had added a vomiting gas to force their foes to unmask so the phosgene could reach the lungs. By mid-1916 the French and Austrians had introduced another family of toxic gases called "Blood Gases." In July 1917 the Germans introduced mustard gas--a blistering agent that could produce casualties among masked troops. In February 1918 the American troops were attacked by Germans using phosgene and chlorophicrin gas. The American forces retaliated for the first time in June of 1918 with phosgene. World War I saw both sides employ approximately 17,000 chemical troops to cause more than one million casualties, 90,000 of whom died.[1]

Chemical warfare was horrifying to the civilized world, but it also offered the possibility of the discovery of more humane weapons. This possibility was recognized, to a degree, through a comparison study of American casualties. One third of ou casualties were caused by gas, of whom approximately two percent died. In contrast, 25 percent of the non-gas casualties died.[6] In all, over 3,000 substances were investigated for toxic use in World War I, 32 were tested in combat, and 12 attained noteworthy results.[1]

Post-World War I

Following World War I, a new attempt was made in 1921, at Washington, DC, to prohibit the use of war gases and similar materials. This subsequent proposal was not ratified by France and, as a result, the proposal was voided. In 1925, at the Geneva Conference, a treaty resolution called for prohibition of war gases and bacteriological warfare. Great Britain, the USSR, and other nations, in ratifying the treaty, made it clear that they were bound only in relation to other countries complying with the treaty terms. The United States, Japan, Czechoslovakia, Argentina, and Brazil did not sign the treaty.[1,3]

Eleven years later the world would learn that the treaty was not an effective deterrent. In 1936 the Italians used mustard gas against the bare-footed local forces of Abyssinia; both countries were signatories of the 1925 Geneva Protocol against the use of gas. Between 1937 and 1943 the Japanese repeatedly used gas attacks against the Chinese forces to overcome their superiority in numbers.[1,4]

World War II

In general, toxic gas employment did not play an important tactical role in World War II. Incendiaries represented the principal chemical munition used in that war. Although the major parties to the War carried toxic gases in their inventory, threats of retaliation were credited as the deterrent force.[7] At the close of the war, the Allies were shocked to discover that the Germans possessed large stocks of new gases of the nerve poison category. These were far more deadly than the standard gases available to the Allies.[2] The Russians had captured a German Tabun plant and moved it to Russia; subsequently, tabun (GA) became their standard nerve gas. The United States adopted sarin (GB), which also was discovered by Germany, as its standard nerve agent.[1] Thereafter, stockpiles of nerve gases multiplied on both sides of the iron curtain. Both sides continued research to find new toxic chemical agents of greater lethality and employability.[11]

Korean War

The Korean conflict was conducted without use of toxic chemical agents by either side.[1,4] The Russians accused the UN forces of employing deadly chemical and biological agents. However, no evi.ence was ever produced to support this claim. Conversely, the United States strongly suspected the Chinese and North Koreans of using psychochemical drugs as part of their "brainwashing techniques" on prisoners of war. This opinion was shared by many knowledgeable officials in the Defense Department, several congressmen, and some members of the scientific community.[1,8] Great concern was voiced throughout the military and the general public; could we train, equip, or otherwise prepare our troops to detect and resist the use of chemical agents designed to break their will and cause irrational behavior?

Current

Since the Korean War a great many armed confrontations have been recorded, and although research, development, and stockpiling of chemical weaponry made major strides throughout the world, riot control agents, herbicides, and incendiaries were the extent of chemical munitions known to have been employed. An exception was recorded in the conflict between Egyptian and Yemen forces in 1966-1967 when both sides reportedly used Russian and Bulgarian supplied phosgene gas and perhaps a nerve agent.[8]

Meanwhile, in the United States the national strategy that followed the Korean War moved steadily toward massive nuclear retaliation. Although the policy did not eliminate chemical warfare's importance, it did place primary focus on nuclear weaponry for both offensive and defensive purposes. Research and development in chemical warfare continued, but was marked by a disinterest in its value for future employment. As the impact of the policy of massive retaliation became better understood by researchers and planners alike, concern for an alternative to this policy became apparent. Among the alternatives considered was a greater role for chemical warfare.[1,6] By the late 1950s the Chemical Corps was experimenting with a wide range of chemical agents, which included the World War II agents of chlorine, phosgene, chlorophicrin, and nitrogen mustards. Also included were the German developed nerve or anticholinesterase agents of GB and GA (sarin and tabun), as well as new, more toxic anticholinesterases. Another category under study was the incapacitating or non-lethal agents.[8] Within this class there was emphasis on both psychochemicals and physical incapacitants. It is this environment and period in our history on which this report will focus.

FOOTNOTES

CHAPTER I

1. House Report No. 815, by The Committee on Science and Astronautics, House of Representatives, 86th Congress, 1959.

2. Report entitled, "Warfare Gases, History, Description, Medical Aspects," by H. L. Gilchrist, undated.

3. Intelligence Staff Study, "Soviet Research and Development Capabilities for New Toxic Agents," dated 1958.

4. Report by Chemical Warfare and the Chemical Warfare Service published in October 1942.

5. Committee (American Chemical Society) Advisory to the U.S. Army Chemical Corps, 19-20 May 1958.

6. The Weekly Publication of the Society of Chemical Industry, Report No. 46, London, dated 12 November 1960.

7. Research paper by Dr. L. Wilson Greene, Army Chemical Center, Maryland, title, "Psychochemical Warfare, A New Concept of War," prepared in August 1949.

8. Minutes of Senate, Foreign Relations Committee hearing of April 1969, 1st Session of the 91st Congress.

9. Chemical Warfare Laboratory Special Publication, "Current Status of Incapacitating Agents Program," by Dr. Witten, dated September 1962.

10. Booklet entitled, "Weapons of Counterinsurgency Chemical/Biological, Anti-Personnel, Incendiary," published by NARMIC on 15 January 1970.

11. History of U.S. Army Chemical Corps, Volumes I and II.

CHAPTER II

PSYCHOCHEMICALS

General

The purpose of this chapter is twofold: the first is to provide a set of common definitions which will be acceptable for use throughout this report; and the second is to trace the discovery and use of LSD and other psychotropic drugs in both ancient and modern times.

The review of the literature and interviews with personnel involved with the drug research program disclosed a degree of confusion resulting from a lack of consensus as to the meaning of specific words and terms associated with chemical agent research efforts. To preclude misinterpretation or ambiguity in subsequent discussions about psychochemicals, terms frequently used in conjunction with the research effort are defined below.

Incapacitating - Non-Lethal Agents are defined as those compounds which when delivered or employed in an effective dose can interfere with an individual's performance of duty for a militarily significant period of time, but which will allow him to recover completely without medical aid.[1]

Physical Incapacitants are those compounds which are active in small doses and which produce a significant or profound disturbance, anesthesia, paralysis, or immobilization for a significant, but temporary, period. Included among the effects are: impairment of vision (physiological); impairment of hearing; postural lowering of blood pressure of such a degree that standing is impossible; rigidity; tremors; convulsions; induction of severe symptomatic nausea and vomiting; and interference with ability to regulate body temperature.[1,2]

Psychological Incapacitants or Psychochemicals are those compounds which produce a mental incapacitation, in effect diminishing a person's will to resist. They effect the central nervous system and may cause one or more of the following: impairment of the thinking process; memory lapse; blackout (mental); or loss of touch with reality.[1]

Psychotropic is a term used almost interchangeably with psychochemical, but without a good semantic justification. Psychotropic drugs are defined formally as those having a tropism or affinity for the psyche or, presumably, the central nervous system. For purposes of this research effort, the following definition will be used: A psychotropic drug is one which produces any degree of mental incapacitation or disassociation, and which could alter the state of mind or mood. Its main effect is on the central nervous system and includes compounds classified as follows:

a. sedatives (hypnotics) which slow mental activity, such as alcohol and barbiturates;

b. stimulants which speed up activity, such as amphetamines and caffeine;

c. tranquilizers (major) which calm psychotic behavior, such as chlorpromazine;

d. tranquiliziers (minor) which calm anxiety, such as meprobamate;

e. anti-depressants which stimulate activity, such as phenolzine; and

f. psychotomimetics (hallucinogenics) which cause deep changes in mood and perceptions, such as LSD and mescaline.

Psychotropic drugs can also be described as either deliriants or hallucinogenics:

a. Deliriant drugs are those which produce or tend to produce delirium as a primary effect. Included within the category are anticholinergics such as scopolamine, benzilates, and glycolates.[2] These drugs may produce vivid visual hallucinations but the memory of them is depressed and the overwhelming drug effect is to slow mental and physical activity.

b. Hallucinogenic or psychotomimetic drugs are those whose effects mimic insanity or psychosis, but which usually are easily differenciated from a true psychosis. These drugs are also called psychedelics (mind manifesting) and include such drugs as LSD and mescaline. These drugs tend to activate rather than depress mental activity. The visual hallucinations they produce sometimes involve bizarre distortions of physical objects and are often vividly remembered.

Chemical agents were not of interest to the military on the basis of their ability to cause hallucinations or delirium as such, but rather for their ability to cause an enemy to be militarily incapacitated, either by sedation, psychosis, or physical means, so that he would not be able to make a normal or routine response to a specific military situation or demand.[1]

Psychochemical Compounds

Several of these compounds have been the subject of extensive medical research and have lengthy and detailed histories. Mescaline, which is obtained from the peyote cactus, can be traced to the ancient Aztec professional diviners, who achieved inspiration by eating either the mescal buttons or the psilocybin producing mushroom. As a matter of interest, the name mescaline was adopted because of its use by the Mescalero Apaches in the 19th century. Indian natives of the Great Plains, where the peyote cactus was readily available, developed the peyoto rite called peyotism, which spread to the Comanches and Kiowas, who transformed the rite into a religion. Eventually, the plains tribes fused their peyotism religion with Christianity and greatly subordinated the ritual use of this hallucinogenic compound.[3] The "Psilocybe Mexicano" mushroom also was used by medicine men of Indian tribes in Mexico during the 19th century.[4]

Hallucinogenic type drug use began with primitive societies as a means of divination, curing sickness, communion with supernatural powers, meditation, and such mundane purposes as allaying hunger, discomfort, and boredom. Although there are many historical examples, a few are worthy of mention to further establish that hallucinogenic drugs and their use are not new.

Siberian tribes, such as the Koryak, Chuckihee, and Kamchadal, have for centuries made use of the hallucinogenic properties of "Fly Agaric," which is derived from a rare mushroom found in the barren and formidable areas of the northeastern regions of Asia. Their use was motivated by a desire to escape from the harsh environment, as well as to facilitate contact with the spirit world.[3]

In Australia, certain Aborigines extracted "pituri" from the leaves of a potato-like shrub. The extraction contained scopolamine, which they used to suppress thirst and hunger.[3]

In Venezuela, Brazil, and Columbia, primitive tribes have for ages escaped the realities of their plight by utilizing the hallucinogenic properties of the "yakee," "epena," "yopo," and "niopo" plants.[4]

Lysergic Acid Diethylamide (LSD)

LSD is one of a group of drugs know as ergot alkaloids. Ergot is formed by the growth of the "ascomycetous fungus" on various grasses and sedges, such as rye, wheat, oats, barley, rice, and algerian diss (a reedy grass of the Mediterranean region used in basket and cord making). The chief botanical source of commercial ergot in the United States and in European countries is the rye plant. Ergot has long been used in medicine because of its specific action in contracting uterine musculature, and was used in midwifery in the 18th and 19th centuries, where it was employed as an abortifacient.[3] The drug still has some use in obstetrics for the control of postpartum hemorrhage, but it has been largely replaced by individual purified alkaloids.[5] Certain alkaloids also have been widely used in the treatment of migraine. The ergot alkaloids can be converted to lysergic acid by subjecting the alkaloid mixture to alkaline hydrolysis followed by acidification.[6]

LSD was first synthesized by Dr. Albert Hofmann, a Swiss chemist at Sandoz Laboratories in Basle, Switzerland, in 1938. However, it was not until April 1943 that Dr. Hofmann discovered its hallucinogenic potential. While working with derivatives of lysergic acid he accidentally exposed himself to a small quantity of lysergic acid diethylamide. In less than an hour he was muddled, confused, and unable to continue his work. He reportedly left the laboratory and returned to his home to rest. He pulled the window shades to block the light because the rays were painful to his eyes. There in the quiet dark of his home he reported having a beautiful experience; thus, his report of LSD's hallucinogenic properties.[3] Another Swiss scientist, Dr. W. A. Stoll, is credited with being the first to systematically investigate the psychological phenomena of LSD.[5] He reported disturbances in perception that led to hallucinations, acceleration of thinking, and slight dimming of consciousness, but without a lessening of judgment. He also found that it was outstanding in producing a clear-cut blunting of the effect and suspiciousness that was often seen in schizophrenic patients. By 1947 Dr. Stoll had completed tests of the drug in both mentally normal and abnormal subjects with no unfavorable after effects.

Meanwhile, in the United States a seed had been planted that would eventually excite a major military interest in the potential use of psychochemical agents.[7] In 1947 Dr. Alsoph H. Corwin, Professor of Chemistry at Johns Hopkins University, wrote the Chemical Corps Technical Command suggesting the potentialities of enzymes as toxicological warfare agents. He offered that with intensive research, it was probable that substances capable of destroying necessary vitamins could be found. The loss of essential vitamins, he opined, held the possibility of producing mass hallucination and uncontrollable hysteria by intoxication.

A year and a half later the Scientific Director, Chemical Corps Technical Command, Army Chemical Center, MD, Dr. L. Wilson Greene, took up Dr. Corwin's theme in a report titled, "Psychochemical Warfare, A New Concept of War."[4] Dr. Greene offered that he was convinced that the trend of each major conflict, being characterized by increased death, human misery, and property destruction, could be reversed. He believed that through psychochemical warfare it would be possible to conquer an enemy without the wholesale killing of his people or the mass destruction of his property. Dr. Greene reported that Dr. Corwin's idea was a major stride forward for mankind, however, he stated that enzymes would decompose with the intense heat created by the explosive charge in munitions or by the heat from most known aerosol devices. Therefore, he proposed a search be made for a stable chemical compound which would cause mental abnormalities of military significance. His report provided a list of 61 materials which were known to cause mental disorders. LSD was not included in his list, which probably indicated a general unawareness in 1949 of the compound by the American scientific community. However, Dr. Greene's study noted that Dr. John P. Clay, Consultant to the Chief, Chemical Division, European Command at Heidelberg, Germany, was aware of Dr. Stoll's investigations in Switzerland with LSD, and he (Dr. Clay) was in a position to monitor future studies that could be beneficial to the psychochemical warfare theme.

Dr. Stoll continued his intense investigation of LSD in Switzerland and by 1949 he had lectured about the "New Hallucinatory Agent" to such gatherings as the Swiss Society of Psychiatry and the Association of Physicians in Zurich.[11] Acclaim of discovery of a major break-through in clinical treatment of mental patients was rapidly growing. The new drug was reported as being very active in unusually low dosage with full recovery in approximately 24 hours. The compound was very expensive, however, and available only from Sandoz Limited of Switzerland. The restricted availability of LSD probably accounts for its delayed introduction into the United States.[4] Even so, in 1950 doctors at St. Louis State Hospital and Washington University Medical School in St. Louis, MO, reported that LSD-25 was a drug that induced a controllable toxic state within the nervous system and that it re-activated anxiety and fear with apparently just enough euphoria to permit recall of provoking experiences. Further, it did not cause the frequently encountered sluggishness of speech associated with other drugs. They opined that LSD offered a means for more readily gaining access to the chronically withdrawn patients and could serve as a new tool for shortening psychotherapy.[8]

A year later (1951) Ypsilanti State Hospital officials reported their experiments which led to the conclusion that lysergic acid diethylamide appeared to be a suitable substance for therapeutic investigation in the treatment of psychoses. It should be noted that in this same time period another aspect of LSD effects was becoming apparent. Specifically, could this or other similar drugs be administered to U.S. officials in order to gain information of national security impact, and what could be done to protect our officials against such an event? This aspect will be explored in greater detail in Chapter 3, concerning the perceived threat.[8]

For the present it is sufficient to state that there was cause for grave concern and a general absence of acceptable answers. In the early 1950s mental institutions, medical schools, and medical research institutions around the world conducted thousands of experiments with LSD in animals and humans. Their findings were published in open literature and used regularly in medical schools and medical association lectures. LSD was determined to be 100 times more toxic or effective than mescaline in treating schizophrenia; a definite aid to psychoanalysis; and a major advancement in the psychotherapy of neuroses. Although LSD was not acclaimed to be a "miracle drug," there were guarded undertones that it could well have that potential. This is evidenced, to a degree, by the wide variety of successful uses of LSD reported. Spring Grove Hospital in Baltimore, MD, recorded measurable success in using LSD to aid in the control and cure of alcoholism. Psychiatrists reported that LSD